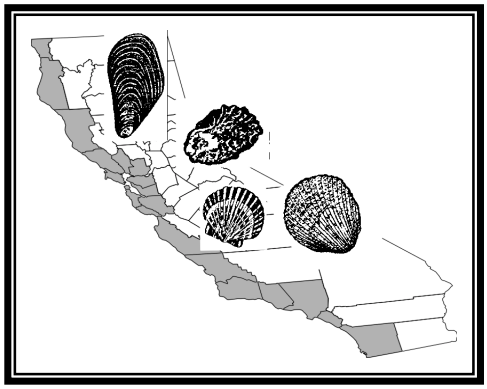
CALIFORNIA DEPARTMENT OF HEALTH SERVICES
2151 Berkeley Way, Room 118, Berkeley, CA 94704

ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

BIOTOXIN QUARTERLY REPORT

October - December 2000



BIOTOXIN SUMMARY
PSP Toxins, Domoic Acid Increase

The enclosed reports (No. 00-29 through 00-34) provide a summary of biotoxin activity and toxigenic phytoplankton distribution for the months of October through December 2000.

By October only low levels of PSP toxins remained following the elevated concentrations observed from July through September. Although the levels of toxin detected in mussels during October were low, the distribution was widespread, ranging from San Luis Obispo County through Humboldt County. Interestingly, *Alexandrium* was observed in very low numbers over a wider range, extending farther south along almost all southern California counties.

Domoic acid was absent from all but one sample during October. Washington clams collected from Bodega Harbor (Sonoma County) were found to contain low levels of domoic acid in both the viscera and the siphon tissue. Despite the general lack of domoic acid in samples our volunteer network of phytoplankton samplers continued to detect *Pseudo-nitzschia*, the toxin-producing diatom, along most of the California coast.

In November there was a continued presence of *Alexandrium*, and the resultant low level PSP toxicity in mussels, at several locations in northern California. This toxin was especially persistent inside Humboldt Bay, where low concentrations were detected during the first three weeks of the month.

The abundance of *Pseudo-nitzschia* declined noticeably by November, however low levels of domoic acid were still detected. Mussels from Morro Bay and crab viscera from offshore of Humboldt County contained low levels of domoic acid.

How to Contact Us:

The Biotoxin Monthly Report is prepared and distributed by the California Department of Health Services' Marine Biotoxin Monitoring and Control Program.

For information on our program please call (510) 540-3423, fax us at (510) 540-2716, or send me an email at glangloi@ix.netcom.com.

Call our toll-free number for recorded information on shellfish quarantines related to marine biotoxins: (800) 553-4133.

By December the toxin concentrations had decreased below detectable levels along the entire California coast. However very low numbers of *Alexandrium* and *Pseudo-nitzschia* continued to be observed.

QUARANTINES

The annual quarantine on sport-harvested mussels was rescinded as scheduled at midnight on October 31st. The annual quarantine on sport-harvested mussels occurs each year from May 1 through midnight on October 31. This quarantine applies only to sport-harvested mussels along the entire California coastline, including all bays and estuaries.

Consumers of Washington clams (butter clams) are cautioned to eat only the white meat. This particular species is known to concentrate and retain the PSP toxins for a long period of time. By discarding the dark part of the siphon and the viscera the consumer can reduce the risk of ingesting these toxins. Persons taking any clams or scallops are advised to remove and discard the dark parts (i.e., the digestive organs or viscera), which are more likely to contain toxins than the white tissue. Persons engaged in the sport-harvesting of any bivalve shellfish should contact our "Shellfish Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity.

Table 1. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during October 2000.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	5
Mendocino	None Submitted	
Sonoma	Sonoma County Public Health Department	3
	California Department of Fish and Game	1
	California Department of Parks and Recreation	1
Marin	Cove Mussel Company	4
	CDHS Environmental Management Branch	2
	Hog Island Oyster Company	2
	Johnson Oyster Company	20
	Marin Oyster Company	5
San Francisco	San Francisco County Health Department	1
San Mateo	None Submitted	
Santa Cruz	Santa Cruz County Environmental Health Department	4
Monterey	None Submitted	
San Luis Obispo	Williams Shellfish Company	4
	San Luis Obispo County Environmental Health Department	1
Santa Barbara	U.C. Santa Barbara Marine Science Institute	5
	California Department of Parks and Recreation	1
	Ecomar, Inc.	5
Ventura	Ventura County Environmental Health Department	1
Los Angeles	None Submitted	
Orange	None Submitted	
	None Submitted	
San Diego	Carlsbad Aquafarms, Inc.	3
	CDHS Volunteer (Paul Sims)	1

Table 2. Agencies and organizations participating in marine phytoplankton sample collection in California during October 2000.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	5
	Arcata High School	5
Mendocino	CDHS Volunteer (Amy Johnson)	1
Sonoma	CDHS Volunteer (Cathleen Cannon)	2
	California Department of Fish and Game	2
	CDHS Environmental Management Branch	1
	Sonoma County Public Health Department	1
Marin	CDHS Volunteer (Brent Anderson)	5
	CDHS Environmental Management Branch	2
	Johnson Oyster Company	20
Alameda	City of Berkeley	1
San Francisco	CDHS Volunteer (Eugenia McNaughton)	3
	Oceanic Society	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	3
	Aptos High School	1
	California Department of Parks and Recreation	4
	San Lorenzo Valley High School	1
	Watsonville High School	1
Monterey	CDHS Volunteer (Lisa Marrack)	2
	CDHS Environmental Management Branch	1
San Luis Obispo	CDHS Environmental Management Branch	2
	Tenera Environmental	2
	Morro Bay 4-H	1
Santa Barbara	California Department of Parks and Recreation	4
	Vandenberg Air Force Base, Environmental Health Services	2
	Ecomar, Inc.	2
	U.C. Santa Barbara Marine Sciences	5
Ventura	California Department of Parks and Recreation	1
Los Angeles	Los Angeles County Sanitation District	3
	Los Angeles County Health Department	2
	Roundhouse Lab and Aquarium	1
Orange	Orange County Sanitation District.	1
San Diego	CDHS Volunteers (Paul Sims, Randy and Bill Dick, Kai Schumann, Jeff Kermode)	6
	San Diego County Environmental Health Department	2

Table 3. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during November 2000.

COUNTY	AGENCY	SAMPLES
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	5
Mendocino	None Submitted	
Sonoma	CDHS Environmental Management Branch	1
Marin	Hog Island Oyster Company	2
	Johnson Oyster Company	16
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	1
Monterey	Monterey County Environmental Health Department	1
San Luis Obispo	Williams Shellfish Company	4
Santa Barbara	U.C. Santa Barbara Marine Science Institute	7
	Ecomar, Inc.	4
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	4
	CDHS Volunteer (Paul Sims)	2

Table 4. Agencies and organizations participating in marine phytoplankton sample collection in California during November 2000.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	3
	Arcata High School	1
Mendocino	None Submitted	
Sonoma	CDHS Volunteer (Cathleen Cannon)	1
	Bodega Marine Lab	2
	CDHS Environmental Management Branch	1
Marin	CDHS Volunteer (Brent Anderson)	4
	California Department of Fish and Game	1
	Oceanic Society	2
	Johnson Oyster Company	16
Alameda	City of Berkeley	2
San Francisco	CDHS Volunteer (Eugenia McNaughton)	4
	Gulf of the Farallones National Marine Sanctuary	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	6
	California Department of Parks and Recreation	3
	Aptos High School	1
	San Lorenzo Valley High School	1
Monterey	CDHS Volunteer (Lisa Marrack)	2
San Luis Obispo	Tenera Environmental	3
	CDHS Volunteer (Jeff Kermode)	1
Santa Barbara	U.C. Santa Barbara Marine Sciences	6
	California Department of Parks and Recreation	3
	Vandenberg Air Force Base, Environmental Health Services	2
	Ecomar Inc.	1
Ventura	California Department of Parks and Recreation	3
Los Angeles	City of Los Angeles Environmental Monitoring Division	2
	Los Angeles County Sanitation District	4
	Los Angeles County Health Department	4
	Roundhouse Lab and Aquarium	1
	CDHS Volunteer	1
Orange	Orange County Sanitation District	3
San Diego	CDHS Volunteers (Randy and Bill Dick, Paul Sims, Kai Schumann, Jeff Kermode, Vicki Ganguli)	9
	San Diego County Environmental Health Department	2

Table 5. California Marine Biotoxin Monitoring and Control Program participants submitting shellfish samples during December 2000.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	Cove Mussel Company	2
	Hog Island Oyster Company	3
	Johnson Oyster Company	16
	Marin Oyster Company	4
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	1
Monterey	Monterey County Environmental Health Department	1
San Luis Obispo	Williams Shellfish Company	4
Santa Barbara	U.C. Santa Barbara Marine Science Institute	8
	Ecomar, Inc.	2
Ventura	None Submitted	
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
	Ecomar, Inc.	1
San Diego	Carlsbad Aquafarms, Inc.	1
	CDHS Volunteer (Paul Sims)	2

Table 6. Agencies and organizations participating in marine phytoplankton sample collection in California during December 2000.

COUNTY	AGENCY	SAMPLES
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Arcata High School	6
Mendocino	None Submitted	
Sonoma	Bodega Marine Lab	1
	CDHS Environmental Management Branch	2
Marin	CDHS Volunteer (Brent Anderson)	3
	Johnson Oyster Company	16
Alameda	City of Berkeley	1
San Francisco	CDHS Volunteer (Eugenia McNaughton)	3
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	Santa Cruz County Environmental Health Department	3
	San Lorenzo Valley High School	2
	Watsonville High School	1
Monterey	U.C. Reserve System	1
San Luis Obispo	Tenera Environmental	2
	CDHS Environmental Management Branch	2
Santa Barbara	California Department of Parks and Recreation	2
	U.C. Santa Barbara Marine Sciences	9
	Vandenberg Air Force Base, Environmental Health Services	2
	Ecomar, Inc.	3
Ventura	California Department of Parks and Recreation	1
Los Angeles	Los Angeles County Environmental Health Department	2
	Los Angeles County Sanitation District	4
	Roundhouse Lab and Aquarium	2
Orange	Orange County Sanitation District	6
San Diego	CDHS Volunteer (Kai Schumann, Jeff Kermode, Paul Sims, Vicki Ganguli)	6
	San Diego County Environmental Health Department	3

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

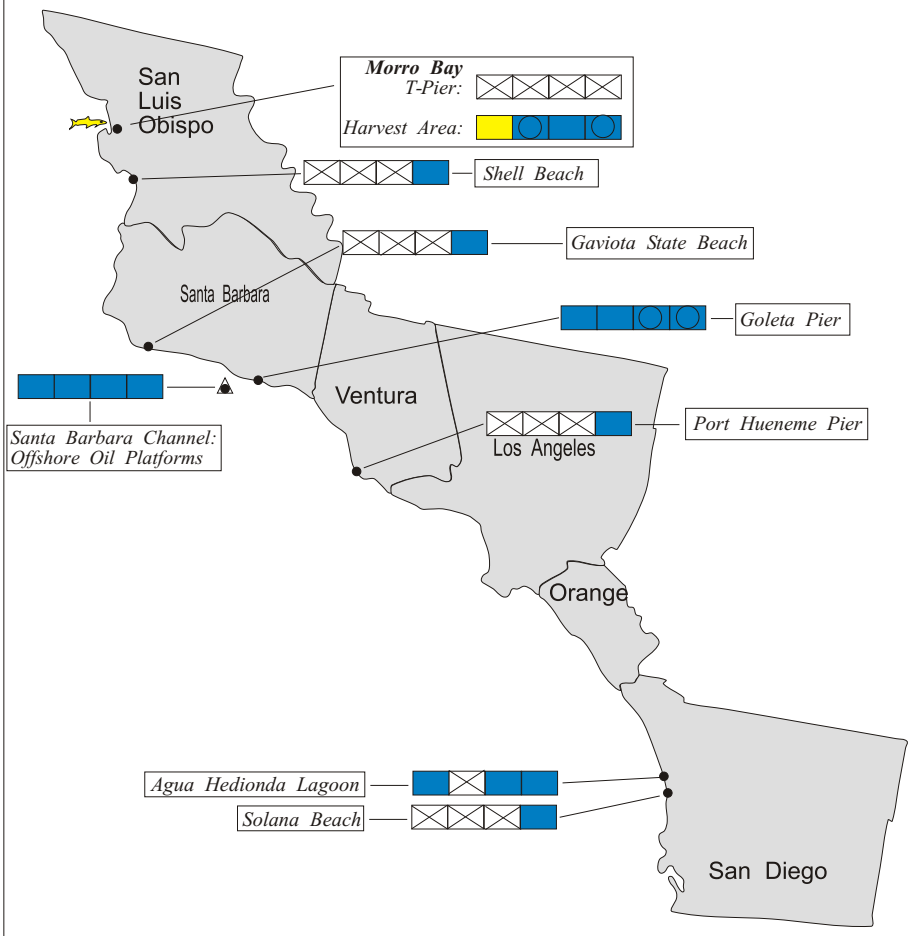
SHELLFISH BIOTOXIN MONTHLY REPORT

October 2000

Technical Report No. 00-29

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥ 80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥ 20

[1] PSP Alert Level [2] DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, October 2000.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): Low levels of PSP toxins were detected in mussels from Morro Bay (San Luis Obispo County) during the first week of October.

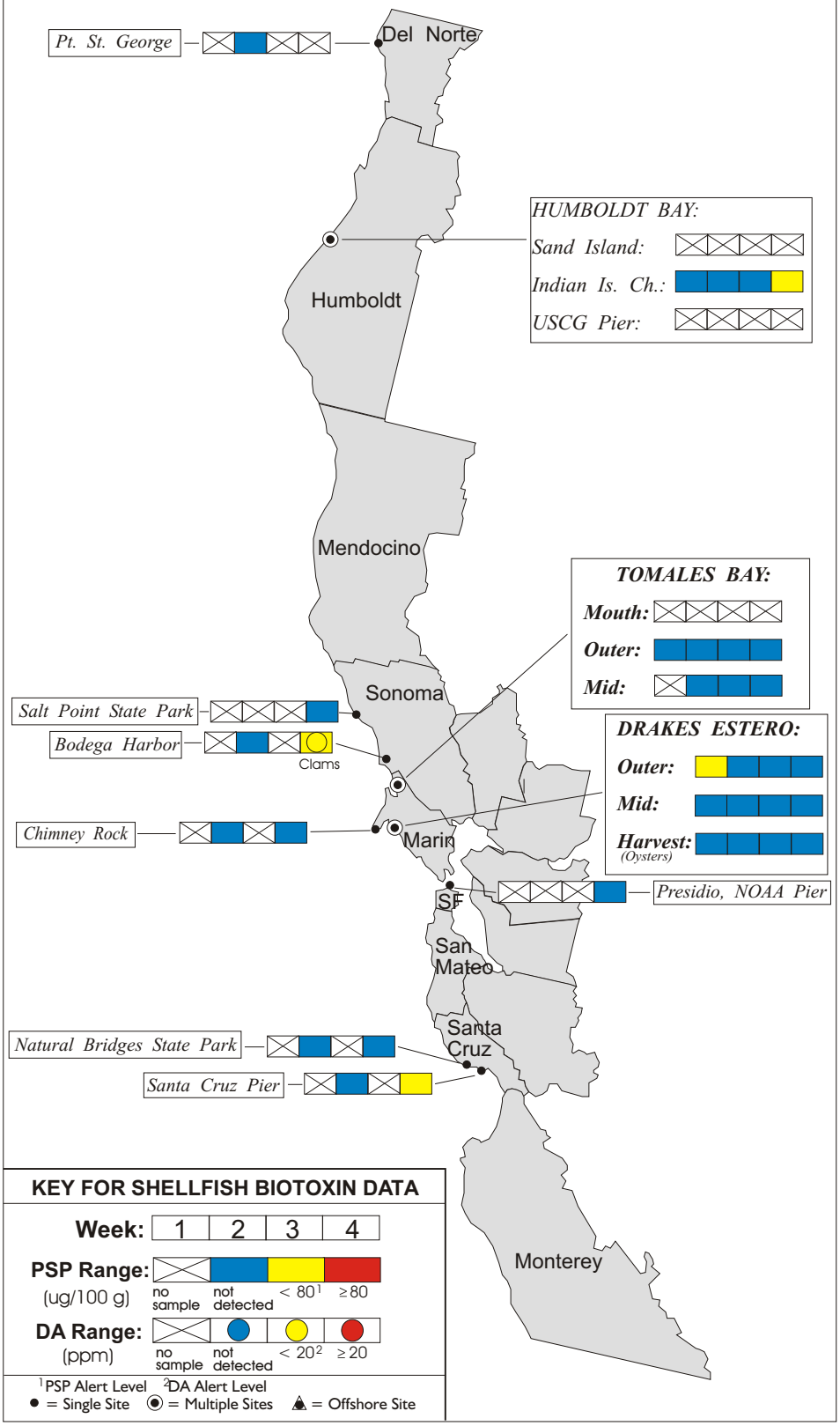
Domoic Acid (DA): A low level of domoic acid (2.2 ppm) was detected in an anchovy sample collected by the Department's Food and Drug Branch (FDB) in the vicinity of Morro Bay.

For Information on our Volunteer Field Sampling Program Please Call:

(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was detected at several northern California sites during October.

Low levels of PSP toxicity were detected at sites in Humboldt, Sonoma, Marin, and Santa Cruz counties. The low levels of PSP toxins detected in Bodega Harbor (Sonoma County) were found in both the siphon and viscera of Washington clams.

Domoic Acid (DA):

A sample of Washington clams from Bodega Harbor contained a low level of domoic acid (2.2 ppm) in the viscera.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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2151 Berkeley Way, Berkeley CA 94704-1011

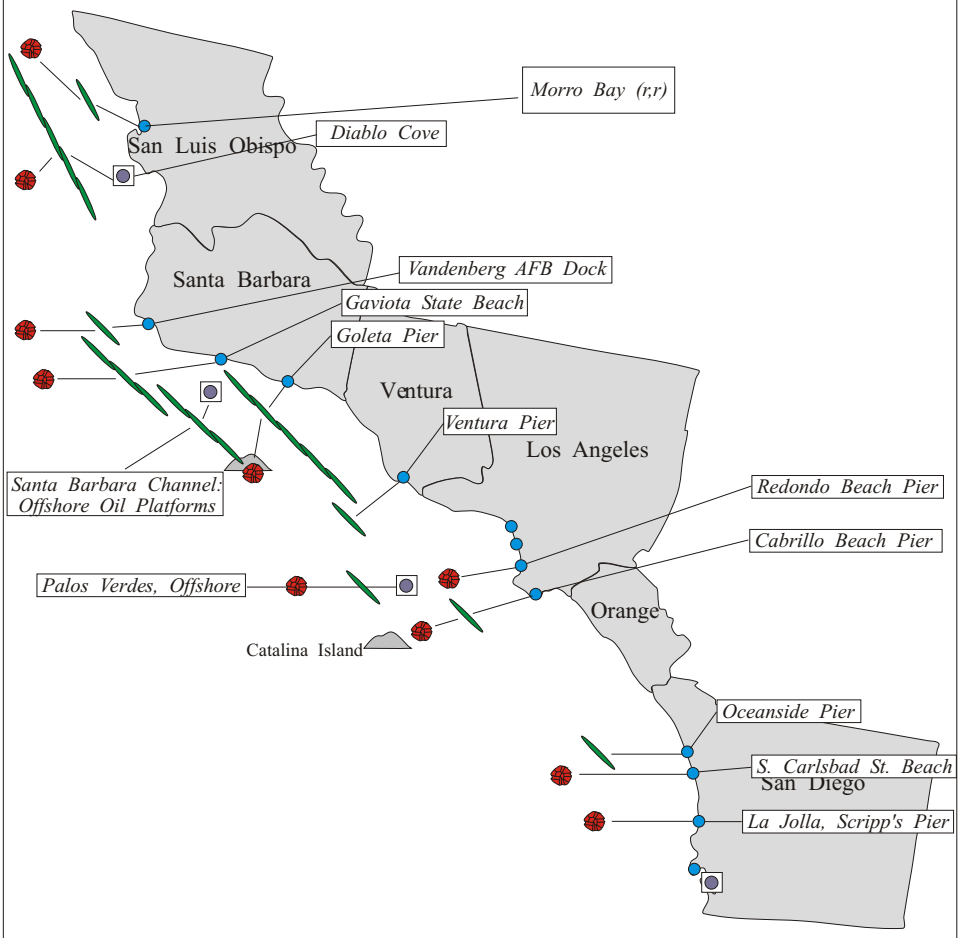
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

October 2000

Technical Report No. 00-30

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed along the entire southern California coast during October.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along all southern California coastal counties. High relative abundances were observed along the coast of San Luis Obispo and Santa Barbara.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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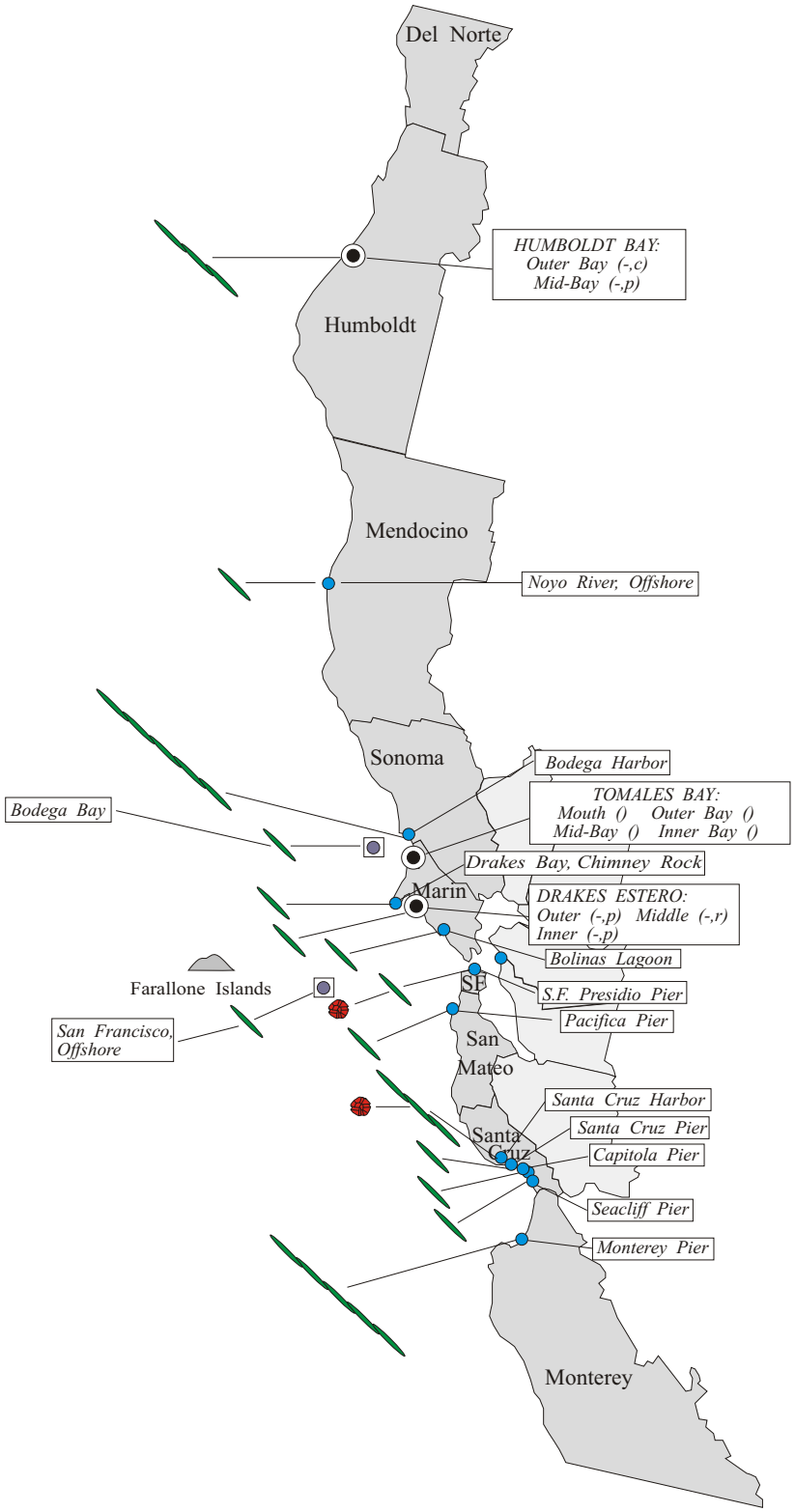
Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* distribution and abundance decreased dramatically from September through October. Low numbers of this dinoflagellate were detected in samples from San Francisco and Santa Cruz.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). The distribution and abundance of *Pseudo-nitzschia* in October was similar to the pattern observed in September. The highest relative abundances of this diatom were observed inside Monterey Bay and in Bodega Harbor.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

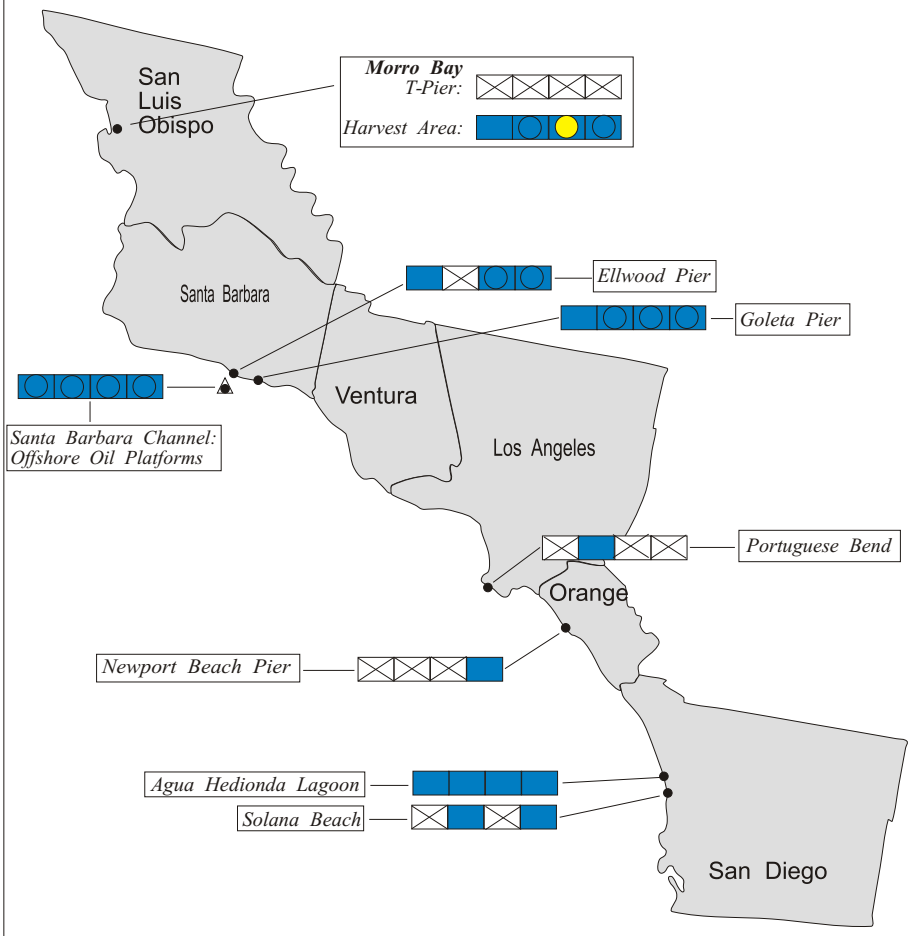
SHELLFISH BIOTOXIN MONTHLY REPORT

November 2000

Technical Report No. 00-31

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

Week:	1	2	3	4
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, November 2000.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in November.

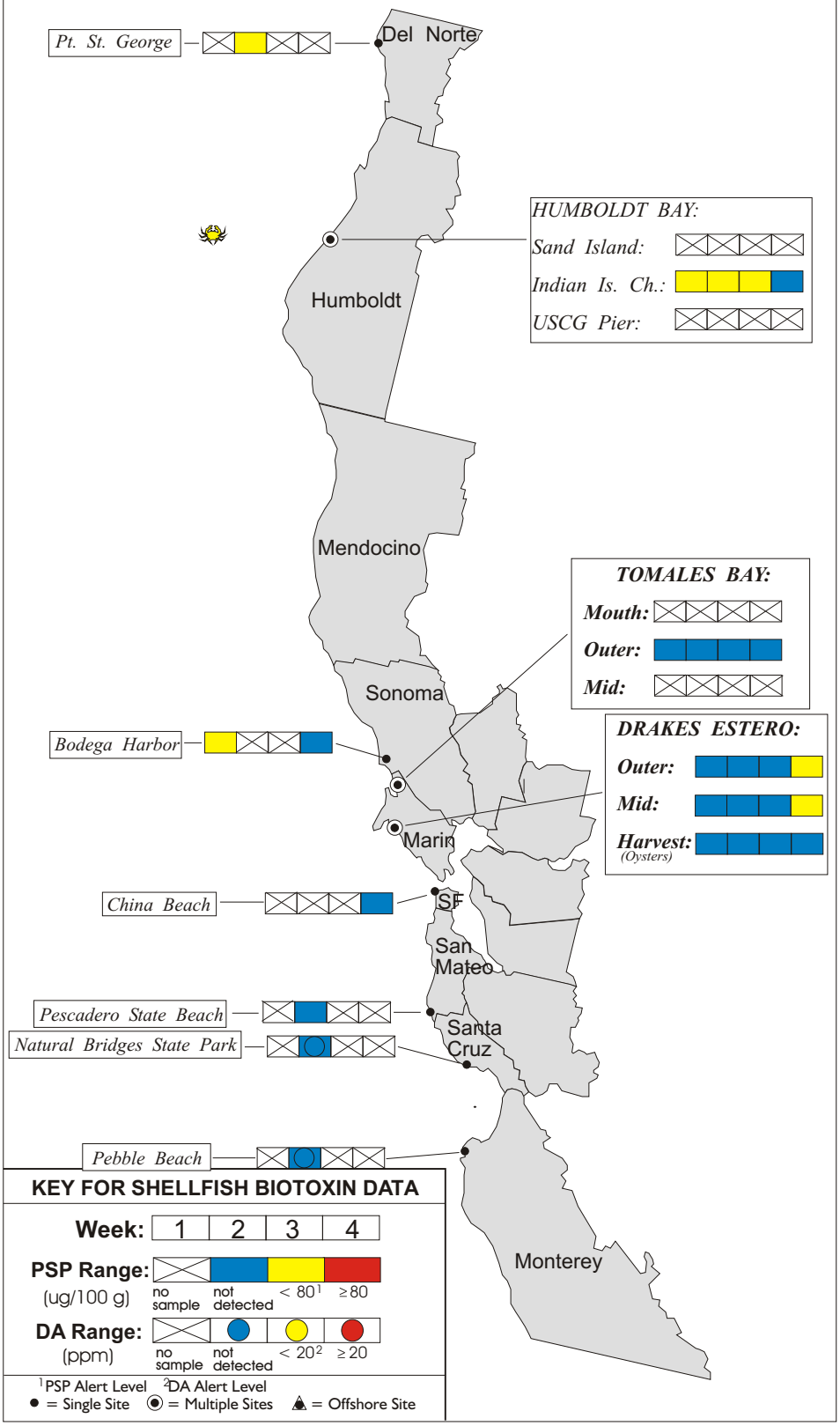
Domoic Acid (DA): A low level of domoic acid (1.8 ppm) was detected in a mussel sample from Morro Bay (November 19).

For Information on our Volunteer Field Sampling Program Please Call:

(510) 540-3423

Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

Low levels of PSP toxicity were detected at sites in Humboldt Bay, Bodega Harbor, and Drakes Estero during November.

Domoic Acid (DA):

The Department of Health Services' Food and Drug Branch and Food and Drug Laboratory, in cooperation with the Department of Fish and Game, collected and analyzed a large number of crab samples for domoic acid during November. DA was detected in the crab viscera in a number of samples, with all toxin levels below the federal alert level. DA was not detected in shellfish samples from Santa Cruz and Monterey during November.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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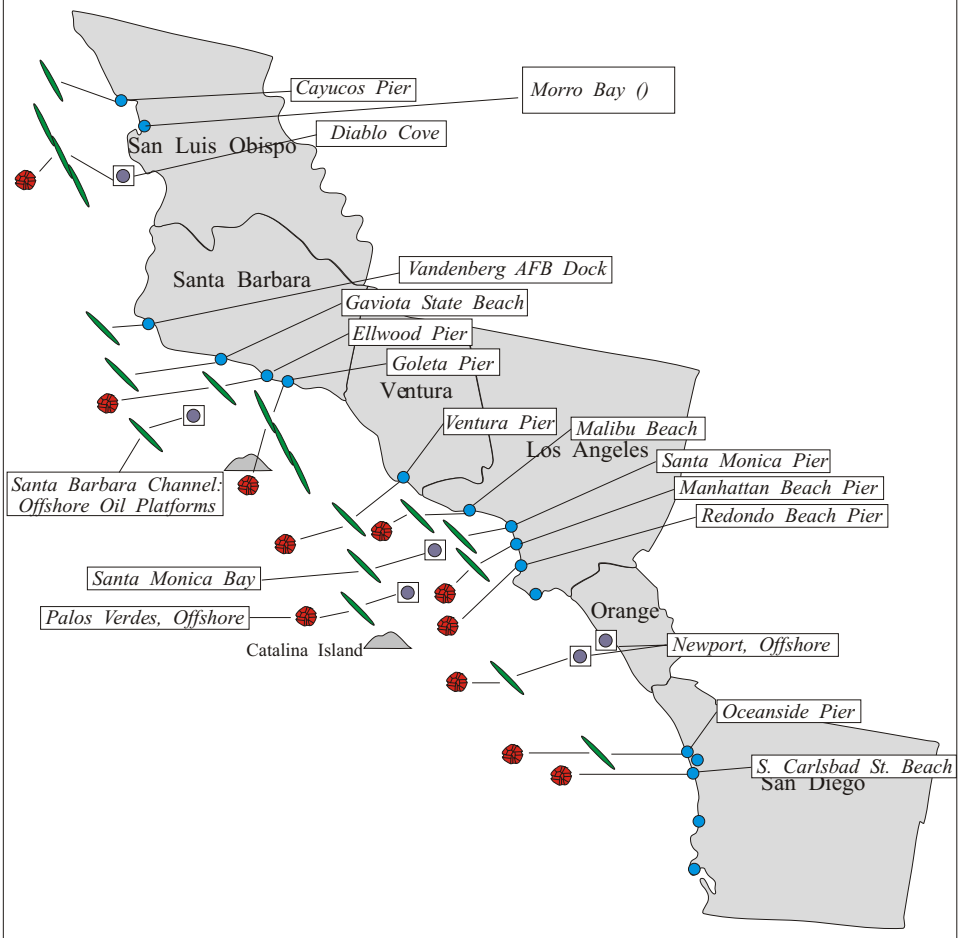
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

November 2000

Technical Report No. 00-32

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed along the entire southern California coast during November.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along all southern California coastal counties. In general the relative abundances of this diatom were reduced from October's observations. The highest concentrations of *Pseudo-nitzschia* were detected at sites in San Luis Obispo and Santa Barbara counties.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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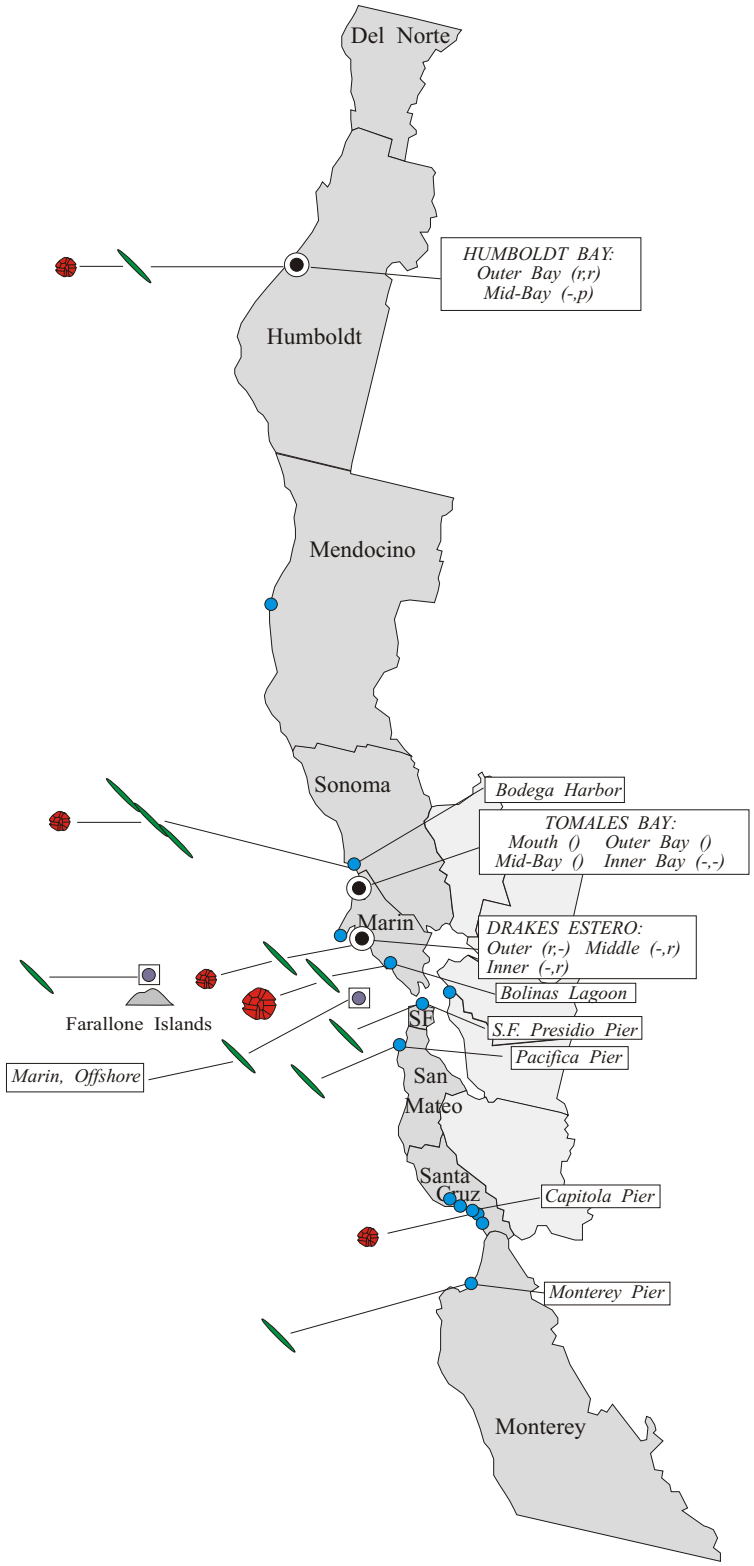
Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were identified at several sites along the northern California coast during November.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed at several sites along the northern California coast in November. The relative abundance of this diatom was reduced from the previous month's observations.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

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ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring and Control Program

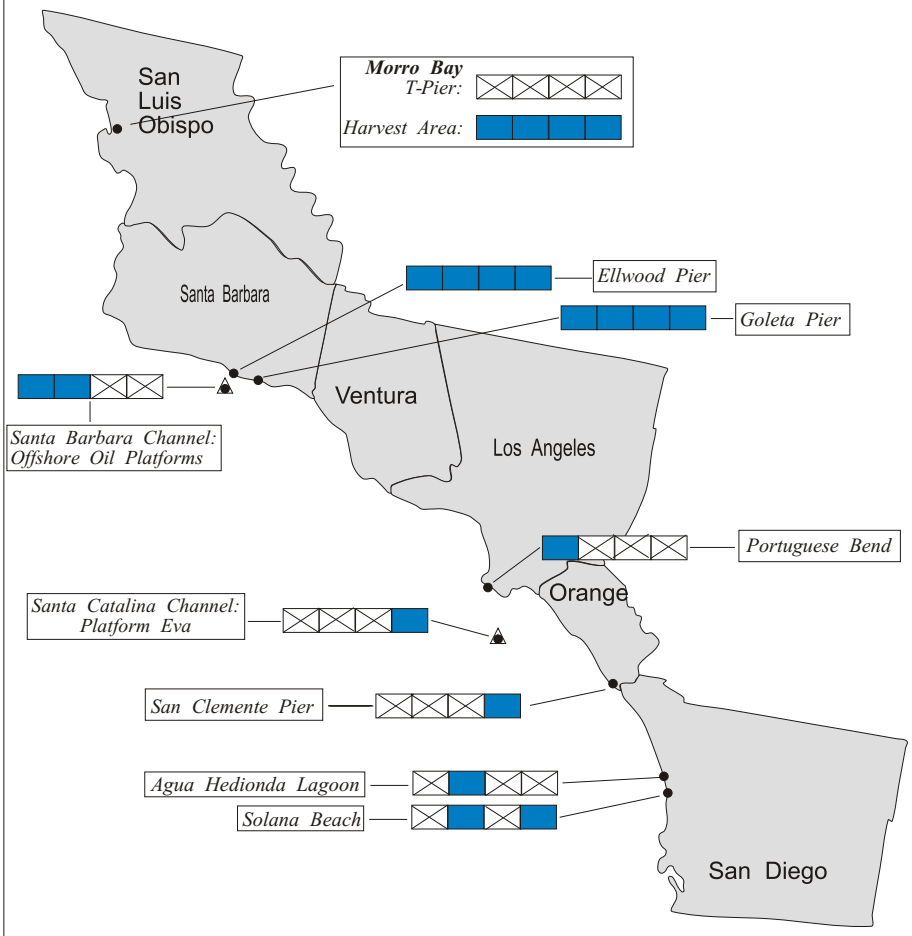
SHELLFISH BIOTOXIN MONTHLY REPORT

December 2000

Technical Report No. 00-33

Distribution of Shellfish Biotoxins

Southern California



KEY FOR SHELLFISH BIOTOXIN DATA

	1	2	3	4
Week:				
PSP Range: (ug/100 g)	no sample	not detected	< 80[1]	≥80
DA Range: (ppm)	no sample	not detected	< 20[2]	≥20

[1]PSP Alert Level [2]DA Alert Level
● = Single Site ◉ = Multiple Sites ▲ = Offshore Site

Source: DHS Marine Biotoxin Monitoring and Control Program, December 2000.

INTRODUCTION:

Please note the following conventions: (i) All data are for mussel samples, unless otherwise noted; (ii) All samples are analyzed for PSP toxins; domoic acid (DA) analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA). Please refer to the figure key for an explanation of the symbols used for the time of month of sample collection and the toxicity range.

Southern California Summary:

Paralytic Shellfish Poisoning (PSP): PSP toxins were not detected in shellfish samples from southern California sites in December.

For Information on our Volunteer Field Sampling Program Please Call:

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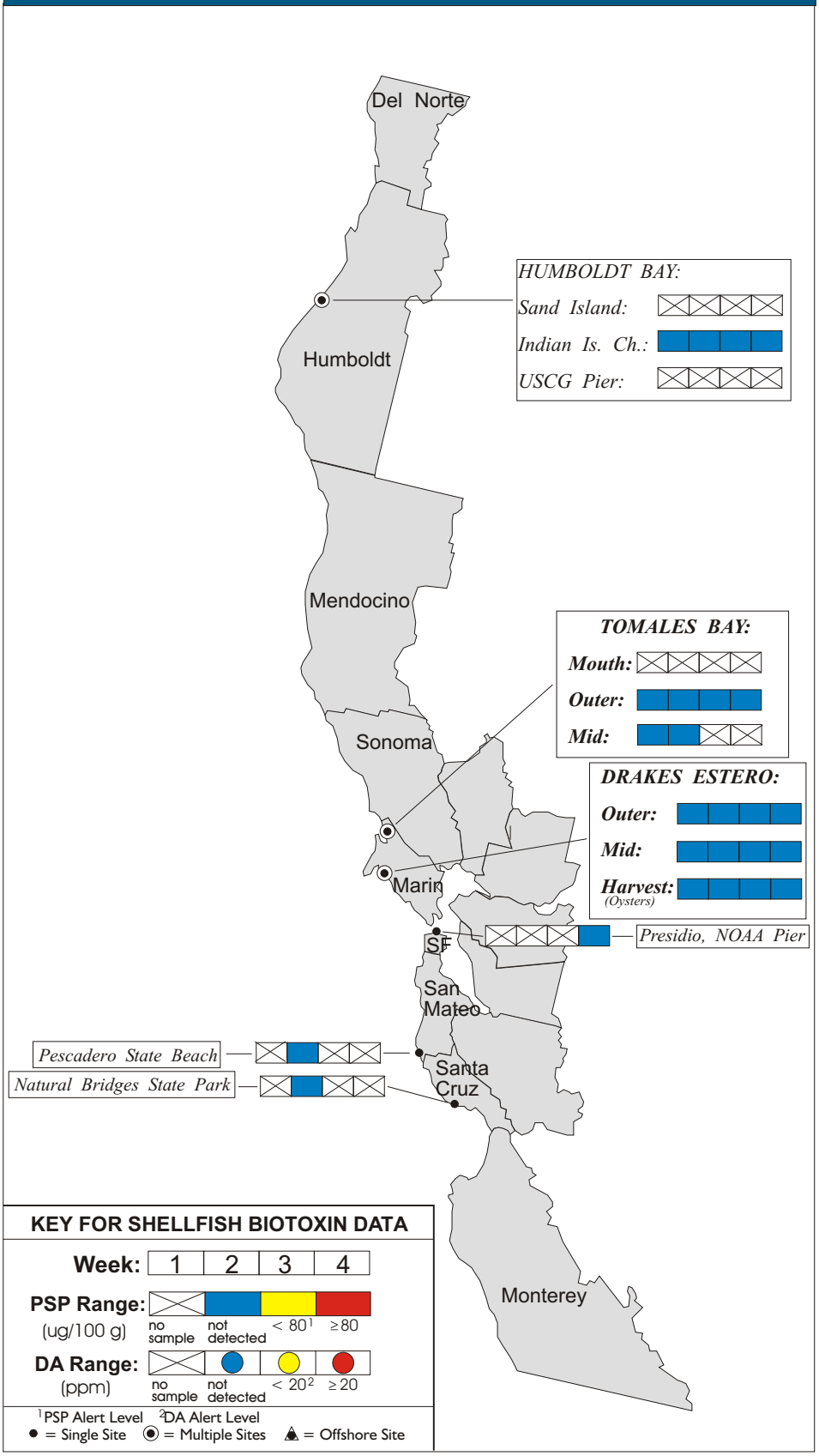
Distribution of Shellfish Biotoxins

Northern California



Northern California Summary:

Paralytic Shellfish Poisoning (PSP):

PSP toxicity was not detected at any northern California site during December.

The Marine Biotoxin Monitoring and Control Program is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins.

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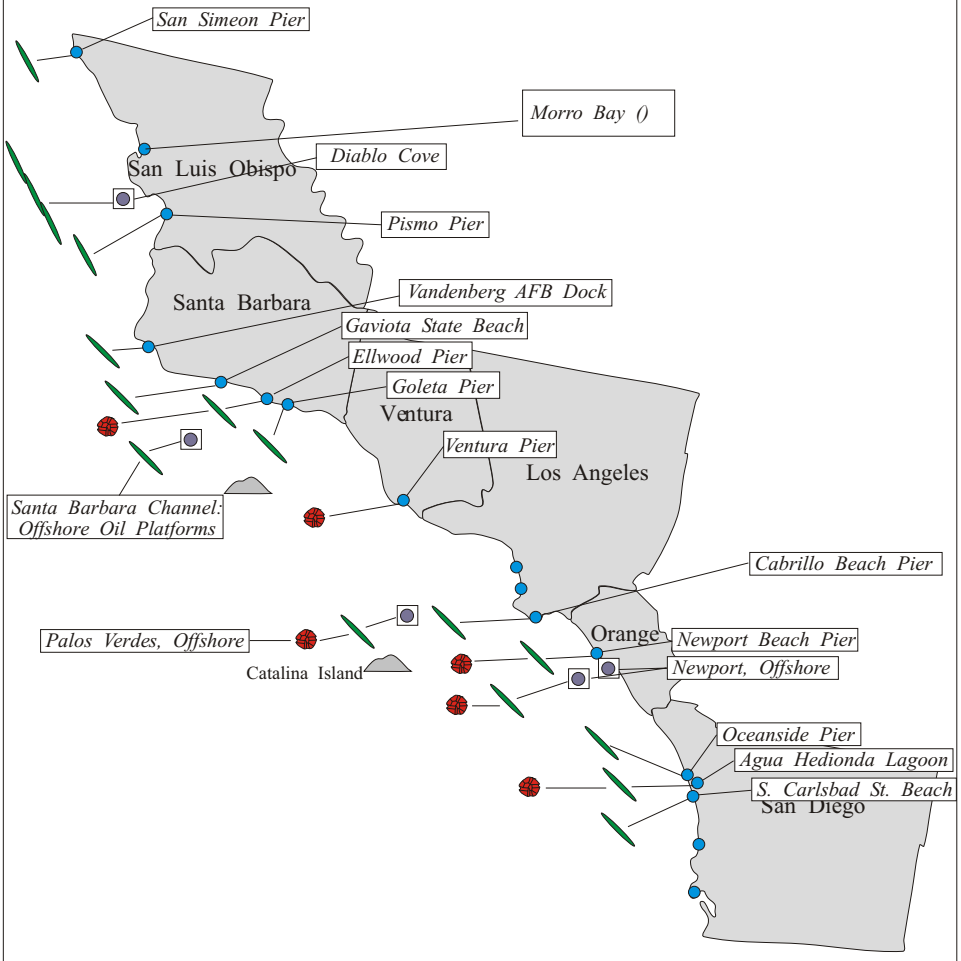
ENVIRONMENTAL MANAGEMENT BRANCH
Phytoplankton Monitoring Program

Phytoplankton Monthly Report

December 2000

Technical Report No. 00-34

Distribution of Toxin-Producing Phytoplankton
Southern California



Relative Abundance of Known Toxin Producers

Alexandrium Species

- Rare (less than 1%)
- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

Pseudo-nitzschia Species

- Present (less than 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(a,p) = Abundance for Alexandrium and Pseudo-nitzschia.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Southern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). Low numbers of *Alexandrium* were observed along much of the southern California coast during December. The overall distribution and abundance of this dinoflagellate was reduced compared to the previous month's observations.

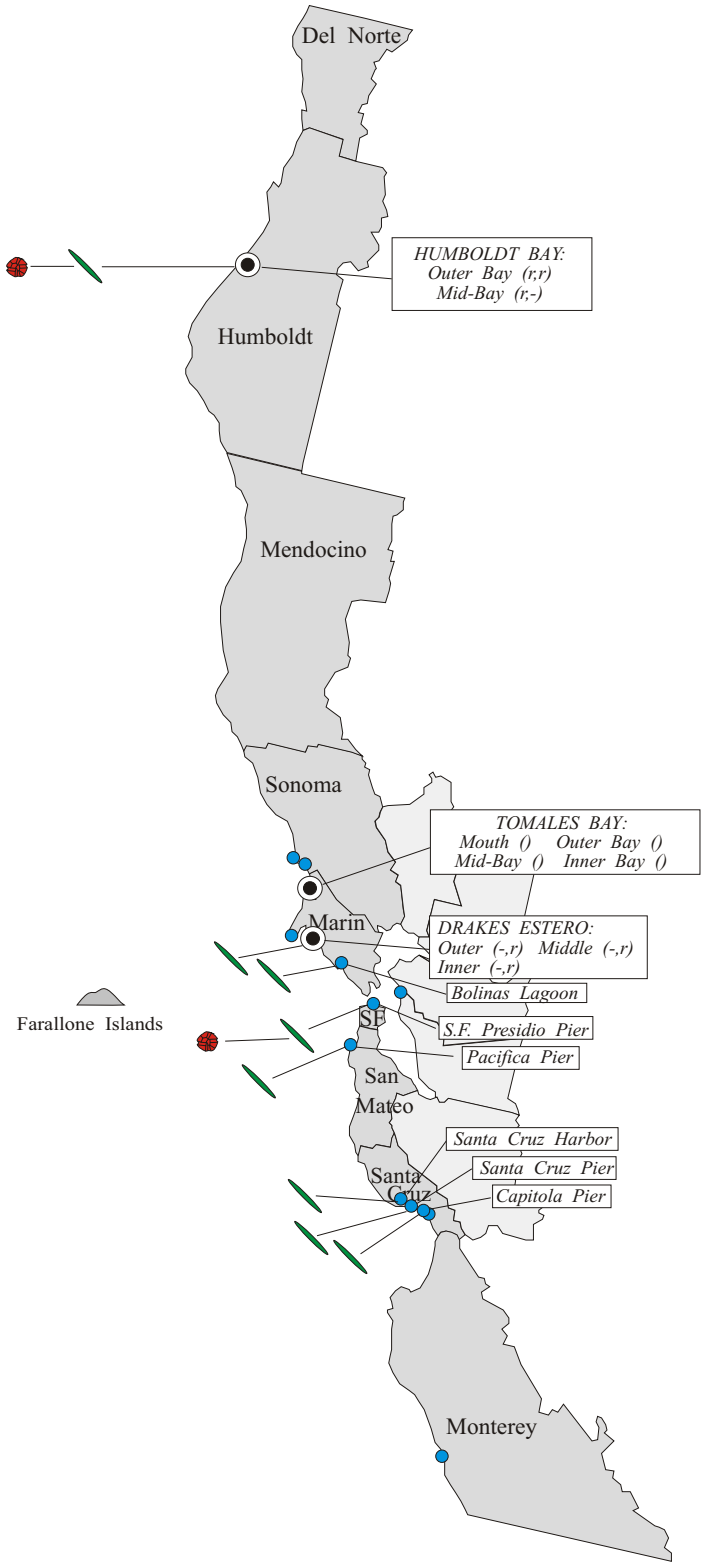
Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed along most southern California coastal counties. In general the relative abundances of this diatom were reduced from November's observations. The highest concentrations of *Pseudo-nitzschia* were detected offshore of San Luis Obispo County.

The Phytoplankton Monitoring Program, managed by the California Department of Health Services, is a state-wide program designed to detect toxin producing species of phytoplankton in ocean water before they impact California's valuable shellfish resources or become a threat to consumer safety.

For More Information Please Call:
(510) 540 - 3423

For Recorded Biotoxin Information Call:
(800) 553 - 4133

Distribution of Toxin-Producing Phytoplankton Northern California



Northern California Summary:

Alexandrium catenella (Dinoflagellate that produces paralytic shellfish poisoning (PSP) toxins). *Alexandrium* was identified at only two sites along the northern California coast during December.

Pseudo-nitzschia species (includes all known potential domoic acid producing diatoms). *Pseudo-nitzschia* was observed at several sites along the northern California coast in December. The relative abundance of this diatom was reduced from the previous month's observations.

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